THE TENNESSEE VALLEY AUTHORITY, ITS COOPERATIVE FERTILIZER

TEST DEMONSTRATIONS, AND THEIR RELATION TO

AGRICULTURAL READJUSTMENT

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One of the major cooperative activities of the Tennessee Valley Authority is concerned with the discovery, experimental production, testing, and introduction of new forms of fertilizing materials. This involves the determination of their relation to mineral deficiencies in soils and their consequent effect on the quality of plant and animal production and upon farm management systems, land-use adjustments, and general rural development. In this program it is cooperating with many national, State, and local agencies, both official and private, including thousands of practical farmers through the agency of the State Colleges of Agriculture.

In order to visualize the background for the fertilizer activities, it is necessary to understand the entire series of statutory objectives of the Authority and the relation of the fertilizer program to the whole. To provide this background of understanding, the statutory objectives are set forth in order. Then the inter-relationships are presented. Finally, the program of testing and introduction of phosphatic fertilizers is explained in detail.

STATUTORY OBJECTIVES OF THE TENNESSEE VALLEY AUTHORITY

The major statutory objectives of the Tennessee Valley Authority, as specified in the Act of 1933, as subsequently amended, are given below. The numbers in parentheses refer to containing sections of the Act.

1. To improve navigation in the Tennessee River (1; 4,j; 9,a).

2. To control destructive flood waters in the Tennessee and Mississippi River Basins (1; 4,j; 9,a).

3. To operate properties at Muscle Shoals in the interest of national defense (1).

4. To manufacture and dispose of electric power generated at dams erected for navigation and flood control, and to build the structures necessary thereto. (4,j; 5,1; 9,a; 10; 11; 17)

5. To make studies and experiments to promote the wider and better use of electric power for agricultural and domestic use, or for small or local industries (10).

6. To cooperate with State governments, or their subdivisions or agencies, with educational or research institutions, and with cooperatives or other organizations, in the application of electric power to the fuller and better advanced development of the resources of the region (10).

7. To improve and cheapen the production of fertilizer (5,d) and, for this purpose, to establish and operate laboratories and experimental plants to furnish nitrogen and other fertilizer products for agricultural purposes in the most economical manner and at the highest standard of efficiency (5,h).

8. To cooperate with national, State, county, and local experiment stations and demonstration farms, for the use of new forms of fertilizer or fertilizer practices during the experimental period of their introduction (5,c).

9. To promote the prevention of soil erosion by the use of fertilizers, and otherwise (5,c).

10. To distribute fertilizer products equitably, by sale or donation, through the agency of county demonstration agents, agricultural colleges, or otherwise, for experimentation, education, and introduction of the use of such products in cooperation with practical farmers so as to obtain information as to the value, effect, and best methods of their use (5,e).

11. To arrange with farmers and farm organizations for large-scale, practical use of the new forms of fertilizers under conditions permitting an accurate measure of the economic return they produce (5,b).

12. To advise and cooperate in the readjustment of the population displaced by the construction of dams, the acquisition of reservoir areas, and other operations, and may cooperate with Federal, State, and local agencies to that end (4,1).

13. To promote the agricultural and industrial development of the Tennessee Valley area, through the operation of properties at Muscle Shoals (1).

INTER-DEPENDENCE OF THE VARIOUS OBJECTIVES

The objectives set forth above are not separate and distinct. Instead, they form a closely interwoven series serving one common purpose. This inter-relationship is explained below.

1. Navigation Promotion. The promotion of navigation requires more than the dredging of channels and the building of locks to lift vessels over bars and dams. It requires a dependable flow of water, neither flood-high nor drought-low, throughout the year.

2. Flood Control. To reach the objective of flood control requires much more than the building of dams and storage reservoirs, important as these are. It requires also whatever practices are necessary to store precipitation in the soil and prevent soil erosion and the consequent silting of reservoirs until they no longer store water. Obviously, this objective is intimately connected with navigation promotion.

3. National Defense. The safeguarding of national defense, through maintaining facilities for the manufacture of nitrogen and

phosphorus for munitions of war, is another major objective. But assured continuous manufacture of these munitions depends upon an assured flow of water for producing the electric energy to run the plants.

4. Electric Power. The manufacture and distribution of electric power is a fourth statutory objective; but its achievement is absolutely dependent on control of the movement of both soil and water above dams and reservoirs, in order to prevent the silting of reservoirs, and to assure an even and dependable flow of water.

5. Fertilizer Activities. Research, manufacture, testing, and use of new forms of fertilizing materials, constitute a fifth statutory objective of the Authority. It is closely related to all the others, a fact that must never be forgotten. Navigation and flood control, national defense, and power development all require the holding of soil and water at the source as well as the holding of water in gigantic reservoirs. This, in turn, requires adequate vegetative cover on watersheds lying above reservoir areas, and such a cover requires adequate fertility of the soil. Most of the soils of the Valley area, as well as those of the United States as a whole, lack sufficient phosphorus to produce such a cover. Phosphorus, properly applied with lime and other amendments as needed, intensifies the development of vegetable matter from the abundant elements of the air, including nitrogen. The vegetative cover so produced on the soil and the organic matter thereby added to the soil are primary factors in the holding of soil and the storage of water at its source.

All of these objectives combined look toward the agricultural and industrial development and rehabilitation of the region and the country through the fuller and better balanced development of its resources, including human resources. To this end, a readjusted program of sound land-use is fundamental because misuse of the land has caused and is causing most of our troubles with soil and water, and others resulting therefrom. Adequate use of mineral plant foods and soil amendments is absolutely fundamental to land-use adjustments.

COOPERATIVE PROGRAM OF FERTILIZER RESEARCH AND TEST-DEMONSTRATION

The Act of Congress creating the Tennessee Valley Authority authorizes it to cooperate with Federal, State, and local official agencies, as well as with farmers and farmer organizations. Early in its history, the Authority decided to unify its agricultural activities with the established regional agricultural program of the State Colleges of Agriculture and the U. S. Department of Agriculture. These institutions are long-established, have effective personnel and accumulated information, and enjoy the confidence and cooperation of the people of their respective States. They made a survey of field conditions and farm practices. As a result they assured the Authority that phosphorus was the key element in the production of soil-building crops, the adjustment of land use, and the control of the movement of water on the land, not only in the Valley area but throughout each of the country.

The Authority thereupon began the development and testing of new forms of phosphatic fertilizers in complete cooperation with these

established State and Federal agencies. Such cooperation not only saves time and money, but also prevents duplication.

The cooperative program with new fertilizer materials comprises three parts. These are: (1) Research on new materials and methods of manufacture; (2) Controlled experiments in greenhouse, plot, and field on the effects and value of the new fertilizers on different crops, under different conditions of soil and climate; and (3) Widely-distributed test-demonstrations on the farms of practical farmers. These activities are conducted with the State Colleges of Agriculture, through their Agricultural Experiment Stations and Agricultural Extension Services.

The intensive research on the discovery of new fertilizer materials and processes of production at present is conducted within the Valley. The controlled experiments on the effects of new forms of fertilizers on various soils, crops, and systems of farming, are conducted cooperatively with many States, both within and outside of the Valley area. The carefully planned cooperative test-demonstrations on farms are conducted extensively within the Valley States and gradually are being extended to other States as these are able to develop suitable programs in selected counties representing different soils and varying types of farm enterprise and organization.

These farm tests with new forms of phosphate fertilizer have one principal purpose, with two distinct aspects. The first is to determine under what conditions and to what extent their adequate application, with lime and other supplements as needed, and with proper soil- and farm-management practices, will produce and maintain a sufficient soil- and water-holding and soil-building vegetative cover on lands needing such protection. The second is to discover, by adequate methods of measurement, the economic return they produce when applied in conjunction with an approved system of farm-management, including such readjustments as are recommended by the States. Conducting these tests cooperatively enables the States to obtain the benefit of large quantities of erosion-controlling fertilizing materials not otherwise available and thus expand greatly their previous programs of soil-conservation and water-holding practices on farms.

The farm test-demonstrations of new phosphate fertilizing materials are known as community farm tests. These are conducted on a suitable and easily-accessible farm selected by the farmers of the community, in co-operation with the County Agent, and approved by the county association of farmers and the State Extension Director. This farm is known as a Community Test-Demonstration Farm. Such a Test-Demonstration Farm may be located in each participating community in each county selected. The owner or operator agrees with the local association of farmers to carry forward an approved five-year farming program, as a community service. He assumes such expenses and risks as are involved in any necessary readjustment. Phosphate fertilizers are furnished by the Authority for use on his specified soil-holding and soil-building crops, such as grass and legume hay and pasture crops. None of the Authority phosphate may be applied to row crops or other soil-depleting crops.

It should be noted especially that, on the community test farms, the program is planned for the whole farm as a unit enterprise, and not merely as a collection of separate fields or enterprises. A rough soil map of the farm, the cropping history of the different fields, the projected livestock equipment and program, and an outline of the five-year approved farm program, as well as income and expenses, and other data, are required. The approved and readjusted farm program looks toward permanent soil-holding and soil-building through the use of proper crops and cropping practices.

Counties preferably are the units in starting these fertilizer tests with farmers. It is not feasible to consider establishing such tests in all of the counties of any State. Enough counties may be selected to represent the different important soil types and type-of-farming areas. Roughly speaking, the number of counties needed to do this probably will not exceed from 0 to 15 per cent of the total number of counties in the State. The percentage required naturally may vary somewhat with the diversity of soil, climate, and agriculture.

Several additional States lying wholly outside the Tennessee Valley area are considering the question of cooperating with the Authority in farm tests of the new phosphate in a program of land-use adjustment designed to increase soil fertility and to promote the holding of soil and water through the wider use of grass and legumes. For their assistance in organizing such a cooperative testing program, the foregoing discussion of objectives and procedures has been prepared.

There has been prepared a suggested form of memorandum of agreement for such cooperation between the State College of Agriculture and the Tennessee Valley Authority. It outlines the needs for such a testing program and the objectives to be attained. It then lists: A, The responsibilities of the State College of Agriculture; B, The joint responsibilities of the College and the County Land-Use Associations and Community Land-Use Committees of farmers; C, The joint responsibilities of the College and the Tennessee Valley Authority; and D, The responsibilities of the Authority, in such a program. Copies will be sent on request.

While it is not required that the agreement be literally the same as the suggested form, this latter does represent agreements that have been approved and appear to be working satisfactorily. Suggestions will be gladly received.